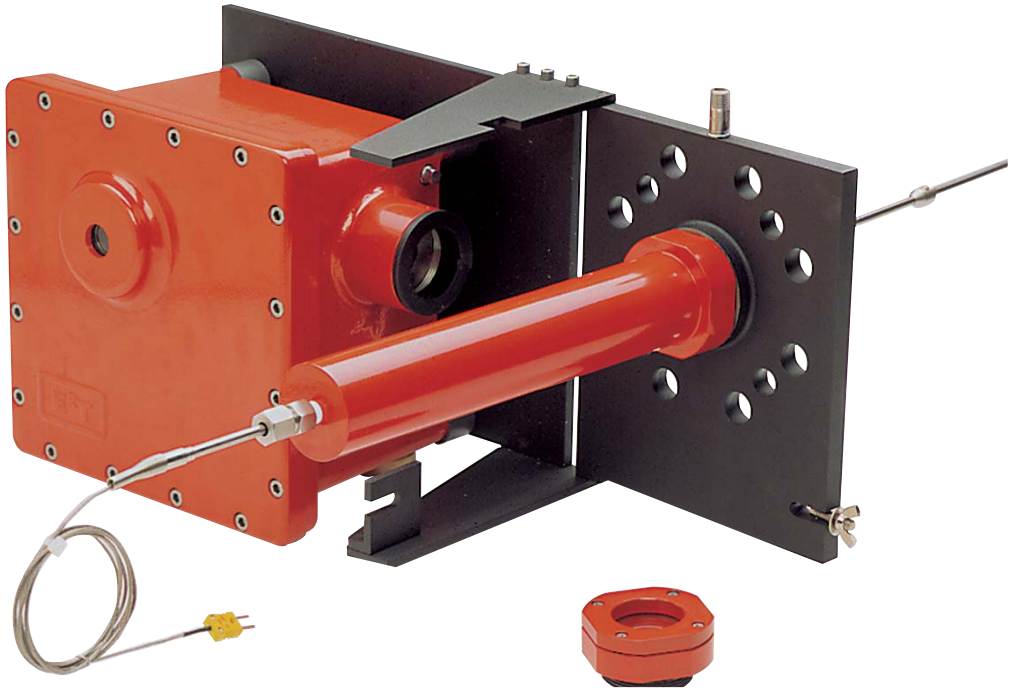
Infrared Thermometry For Sulfur Reactors and Other High Temperature Furnaces

E²T Pulsar III

- Simultaneous Measurement of Refractory and Gas Temperature
- Instant or Average Readings
- CSA/US, KEMA and ATEX Explosion-Proof Certification
- RS485 Digital Communications for Remote Control of Parameter Settings
- Interchangeable with Existing E²T Installations*



*The Pulsar III requires 24VDC, 5A. An external 24VDC power supply with the same Ex ratings as the Pulsar III is available as an option. Ask for part no. 21618.

LumaSense Technologies' new generation LumaSense E²T Pulsar III combines continuous measurement of gas and refractory temperatures, reporting both readings simultaneously in one instrument.

Complex Processes

Optimal operation of your Sulfur Recovery Unit (SRU) requires measurement and control of a complex sequence of processes. Of particular importance is control of the reaction furnace temperature to prevent damage to the refractory at high temperatures and ammonium salt from plugging the converters at low temperatures.

Installations that use the reaction furnace to incinerate waste gases like ammonia and hydrocarbons must maintain an adequate temperature to assure their destruction. Advanced processes, such as O_2 enrichment, normally involve even higher temperatures and demand close monitoring.

Temperature Systems

LumaSense's E²T products solve your furnace temperature measurement requirements with sophisticated infrared technology. The PULSAR III is designed to measure two wavelengths for continuous and instantaneous measurement of Refractory Temperature (RT), Gas Temperature (GT) and Integrated Temperature (FF) in the vessel, away from the heat, vibration and corrosive gases. The custom mounting hardware allows for visual inspection of combustion processes, refractory cure-out and preventative maintenance while the vessel is fully operational.

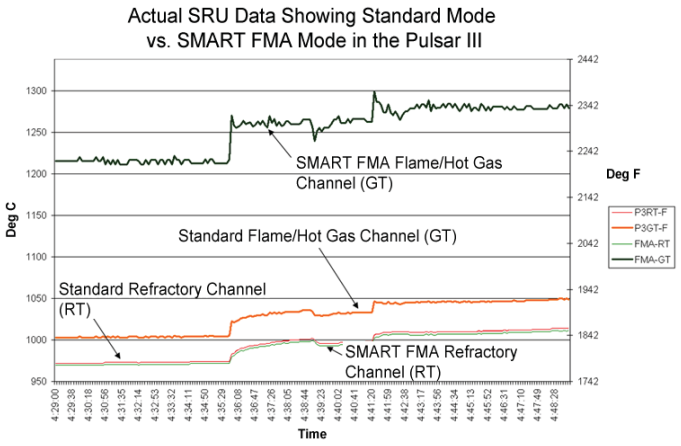
Over 550 refineries, gas plants and petrochemical companies with over 1,700 installations worldwide have looked to us for accurate infrared temperature data. When you install E²T PULSAR III infrared thermometers, you are investing in proven experience, superior performance and ultimate cost savings.

Two Operation Modes: Standard or SMART FMA

LumaSense Technologies has developed a unique method called LumaSense Flame Measurement Algorithm (FMA) to compensate for inter-channel effects when measuring hot gasses and refractory temperatures. In a normal situation, a flame can increase (or reduce) the signal emitted from the refractory depending on the quality, quantity and absorption of the flame.

In a similar manner, some transparency of the flame or hot gas can cause refractory radiance to increase (or reduce) the flame temperature. The FMA algorithm virtually removes these unwanted 'crosstalk' artifacts and solves for more meaningful refractory and flame/hot gas temperatures.

The chart below illustrates the difference between Standard operating mode and SMART FMA operating mode (field switchable). Note that as the flame intensity undergoes step changes, refractory (RT) and standard flame/ hot gas (GT) waveforms have dampened responses. This is expected on the refractory due to the thermal mass of the refractory, but not on the flame response. With SMART FMA activated, the hot gas channel (GT) displays a step change similar to the actual combustion air and gas flows into the SRU.

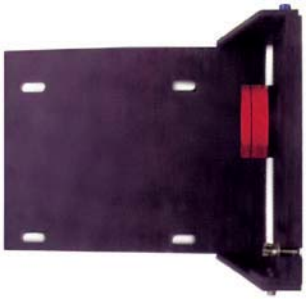


PULSAR III Explosion-Proof Infrared Thermometer
Class 1, Div. 1, Groups C & D

Class 1, Div. 2, Groups A, B, C, D

Ex II2 G EEx d IIB T4

Model COP-10 Clean Out Rod for Clearing Sight-Port



Model SOF-8 Swing-Out Fixture for Sight-Port Access

Model BUP-10 Thermocouple and Adapter for Start-Up and Verification

Field-Configurable to Multiple Temperature Combinations

The Pulsar III has been uniquely designed to have the ability to continuously measure two simultaneous temperatures. For example, one channel can measure refractory wall temperature while the second channel can measure hot combustion gas temperature. The dual channel measurements share the same optical path (viewport, isolation valve, etc.).

Each Pulsar III provides two analog outputs that can be configured as shown in the table. If FMA is turned on, its effect will apply to all outputs.

RT — Refractory Surface Temperature

GT — Average Gas Temperature

FF — Average Integrated Total Temperature

User Selectable Configuration

Channel 1 0/4-20 mA	Channel 2 0/4-20 mA	Comments
RT	GT	Default, as shipped, RT & GT
RT	FF	
RT	RT	Dual current outputs RT
FF	GT	
FF	FF	Dual current outputs FF
GT	GT	Dual current outputs GT

Installation Principles

Location on Furnace

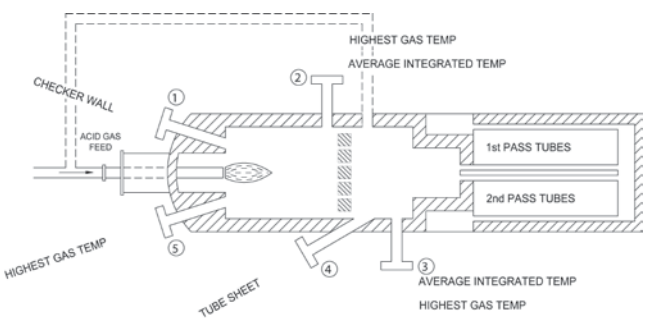
Utilization of the different temperature measurement systems depends upon the feed gases and burner design of the reactor. If you burn simple acid gas with combustion air, the PULSAR III should be installed two-thirds of the way downstream from the burner to the waste heat boiler. If there is a checker wall or choke ring, installation at Locations 2 and 3 (shown in the diagram below) is recommended.

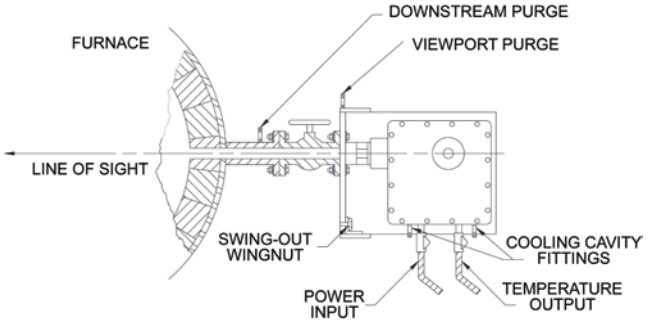
With oxygen-enrichment, refractory integrity is critically important. Burner design and location become paramount in determining the placement of the IR thermometer. The RT Refractory Temperature should be installed aimed at the area where the designers anticipate the highest refractory temperatures. For example, Location 1 is recommended for checker wall protection and Location 4 for tube sheet monitoring. Temperatures at the tube sheet are especially critical since the ferrules and ceramic tube-to-metal junctions may face potential excessive temperature excursions as a result of oxygen-enrichment operations.

Mounting to Furnace

The E²T PULSAR III should be mounted on the horizontal diameter (no greater than ±15°) perpendicular to the vessel sighting on refractory, or adjacent to the burner sighting on the checker wall or tube sheet.

The SOF-8 Swing-out Fixture mounts to a 3 inch 150 or 300 pound ball valve connected to the furnace via a customer-supplied downstream purge connection. Minimum purge rates for downstream and viewport are 10 SCFM and 1 SCFM respectively. The PULSAR III's housing includes a cavity for water or vortex air cooling when ambient temperatures exceed 125° F (50° C). Client-supplied sealed flex lines should be used for power input and signal output in accordance with local codes for hazardous environments.





Technical Data

		Standard Mode	SMART FMA Mode
Temperature Ranges:		350° to 2000° C (662 to 3632° F)	
Field of View		60:1 (1 inch spot size at 60 inch distance)	
Accuracy		±0.5% reading or ±5° C (9° F), whichever is greater	
Repeatability		0.1% of full scale span	
Temperature Resolution		1° C/° F	
Spectral Response		Two narrow bands in the near-infrared region	
Sighting Methods		Through-lens sighting	
Focusing Range		20 inches to infinity (50 cm to infinity)	
Temperature Display		Bright alpha-numeric LED, 4 digits; 17.5mm (L) x 6mm (H) (0.7" x 0.25")	
Temperature Mode		Current temperature, average temperature, peak with auto rese	
Response Time		50 milliseconds for 90% of final reading, adjustable to 120 seconds.	1 second to 120 seconds, adjustable
Emissivity Adjustment		RT Channel: 0.1 to 1.0; GT Channel: 0.1 to 1.0	RT Channel: 0.1 to 1.0; SMART aLP: 0.05 to 1.0 preset to 0.15 at factory
Menu Selection		Push buttons on inside panel or remotely via PC. Selectable items include ° C /° F, alarms, average, emissivity, temperature span, peak and hold, response speed, internal instrument temperature, and FMA on/off.	
Analog Outputs (each Channel)		4-20mA standard; 0-20mA, (500Ω max load) isolated and scaleable	
Digital Output		Half-duplex RS485 communications (network-able), RS-232 (field selectable)	
Alarm Relays		Form C contacts (30 VDC, 1A), one per channel	
Power Requirements		24V nominal (20 to 30 V DC) at 5A max	
Ambient Temperature	Operating	0° to 50° C (32° to 122° F)	
	With water cooling	Up to 95° C (32° to 200° C)	
	With electric heater	-40° to 50° C (-40° to 122° F)	
	Storage	-40° to 80° C	
Housing Material		Housing material (Pulsar III-ATEX): Heavy duty cast aluminum with precision machining	

Explosion-Proof Approvals are on File for Presentation	
CSA/US	Class 1, Div. 1, Groups C & D and Class 1, Div. 2, Groups A, B, C, D
Temperature Code	T4A
ATEX-KEMA	Ex II2 G EEx d IIB T4

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